DOUBLE UNIVERSAL JOINT

Double universal joint for transmitting uniform rotary motion from an input end-shaft to an output end-shaft having shaft axes intersecting with each other at a variable angle,.

To achieve uniformity of the transmitted motion, in the prior art the double universal joints have a central tooth attached at the input end-shaft couppled with a boring on the output end-shaft. The couppling takes place at the center of rotation having limited high stressed contact surfaces. On the other hand, the oil material follows the centrifugal power toward the outside areas, leaving the center at the beguining of rotation.

It is an object of the invention to create unlimited contact surfaces for low stressed areas and to locate said areas at a distance to the axes of rotations.

APPL. No.: 10/816,858

According to the invention

- two input ~~teeth wheels~~ swingers are rotatably mounted at ~~one~~ the input end of a middle-shaft about ~~a~~ an input cross-pivot-axis, and two output-~~wheels~~ swingers are rotatably mounted at the ~~other~~ output end of the same middle-shaft about the ~~other~~ input cross-pivot axis,

- bevel teeth are mounted on each ~~teeth wheel~~ swinger. Bevel teeth are mounted on each end-shaft, couppled with the respective two ~~bevel teeth wheels~~ swingers on the respective middle-shaft end, for turning of each two input- and each output ~~teeth wheel~~ two swingers at same direction about the respective input- and output middle cross-axis when the output end-shaft is turning about the respective input- and output middle cross-axis, and for turning of the same ~~pair~~ two swingers ~~teeth wheels~~ at two opposite directions when the respective end-shaft is turning about the respective end cross-axis.

Parallel teeth are mounted on each ~~teeth wheel~~ swinger for couppling of each two ~~wheels~~ swingers located at two different middle-shaft ends with each other for symmetrically transmitting of each input end-shaft direction to the output end-shaft direction for transmitting of uniform motion.

According to the

After the invention ~~to~~ contact surfaces are unlimited and low stressed areas and located at a distance to the axes of rotations beeing able to keep the oil on the contact surfaces.

The following description of a prefered embodiment will show the principle of the invention.

Fig. 1 is a longitudinal-section A-A according to Fig. 2,
Fig. 2 is a cross-section B-B of the output area, according to Fig. 1,
Fig. 3 is a cross-section C-C of the input area, according to Fig. 1
Fig. 4 is a perspective picture of a part of the invention about the output area.

The double universal joint has an input end-shaft 1 transmitting non uniform motion to the middle-shaft 3 and uniform motion to the output end-shaft 2. The two ends of the middle shaft 3 are provided with sleeves 12, 13, 14, 15 having an input middle cross-axis 46 and an output middle cross-axis 48.
Input end-shaft 1 has a fork 6 with two sleeves 7, 8 and output end-shaft 2 has a fork 9 with two sleeves 10, 11. The two sleeves 7, 8 have a common input end cross-axis 45 and the two sleeves 10, 11 have a common output end cross- axis 47. An input pivot-cross 16 and an output pivot-cross 17 interconnect the three shafts 1, 2, 3 with each other. The input pivot-cross 16 has pivots 18, 19 with an input middle cross-axis 46 rotatably mounted in the two sleeves 12, 13 of the input end of the middle shaft 3 and pivots 20, 21 with the input end cross-axis 45 are rotatably mounted in the two sleeves 7, 8 of the fork 6 of the input end-shaft 1.

The output pivot-cross 17 has pivots 22, 23 with middle cross-axis 48 rotatably mounted in the two sleeves 14, 15 of the ~~other~~ output end of the middle shaft 3 and pivots 24, 25 with output end-cross-axis 47 rotatably mounted in the two sleeves 10, 11 of the fork 9 of the output end-shaft 2.

According to the invention, the sleeves 7, 10 are provided with bevel-teeth 34, 35 ~~for couppling with bevel teeth 36, 37 and 38, 39~~.

Two input swingers 26, 27 provided with parallel teeth 30, 31 ~~for couppling with each other~~ are rotatably mounted on the pivots 18, 19 about ~~with~~ middle cross-axis 46 and two output swingers 28, 29 provided with teeth 32, 33 for couppling with input swingers 26, 27, ~~for couppling with each other~~ are rotatably mounted on the pivots 22, 23 about ~~with~~ output middle cross-axis 48.

All swingers 26, 27, 28, 29 have in addition bevel teeth 36, 37, 38, 39 for couppling with end-shaft sleeves 7, 10 for turning of each two input swingers 26, 27 and each two output swingers 28, 29 at same direction about the respective input and output middle cross-axis 46 and 48 when the input and output end-shaft 1, 2 are turning about the respective input and output middle cross-axes 46, 48 and for turning the two input and output swingers 26, 27 and 28, 29 at two opposite directions about the respective input and output middle cross-axis 46, 48 when the input and output end-shaft 1, 2 are turning about the respective end cross-axes 45, 47. The parallel teeth coupplings of each input swinger 26, 27 with the respective output swingers 28, 29 result to

symmetrically transmitting of each input end-shaft direction to the output end-shaft direction for transmitting of uniform motion.

More embodiments are possible with combinations of different constructions without departing from the principle idea of the invention.